WHAT IS CLAIMED IS:

1. A system for generating electric power in a subterranean wellbore, the system comprising:

a structure which displaces in response to a change in well pressure; and

an electric generator which generates electricity in response to displacement of the structure,

whereby electricity is generated in response to the change in well pressure.

2. The system according to Claim 1, wherein the structure is a piston, and wherein the piston displaces in response to the change in well pressure in an annulus formed between a tubular string and the wellbore.

3. The system according to Claim 2, wherein the change in annulus pressure is an increase in annulus pressure, electricity being generated in response to the increase in annulus pressure.

4. The system according to Claim 2, wherein the change in annulus pressure is a decrease in annulus pressure, electricity being generated in response to the decrease in annulus pressure.

5. The system according to Claim 2, wherein the change in annulus pressure includes both an increase and a decrease in annulus pressure, electricity being generated in response to both the increase and decrease in annulus pressure.

6. The system according to Claim 2, wherein displacement of the piston displaces a fluid, the generator generating electricity in response to displacement of the fluid.

7. The system according to Claim 6, wherein displacement of the piston displaces the fluid through a hydraulic motor connected to the generator.

8. The system according to Claim 7, wherein the hydraulic motor is a turbine.

9. The system according to Claim 7, wherein the piston displaces the fluid through a hydraulic circuit in a first direction when the change in annulus pressure is an increase in annulus pressure, and wherein the piston displaces the fluid through the hydraulic circuit in a second direction opposite to the first direction when the change in annulus pressure is a decrease in annulus pressure.

10. The system according to Claim 9, wherein the hydraulic motor drives the generator in a third direction when the fluid displaces in the first direction through the hydraulic circuit, and wherein the hydraulic motor drives the generator in a fourth direction opposite to the third direction when the fluid displaces in the second direction through the hydraulic circuit.

11. The system according to Claim 10, wherein the generator generates direct current electricity having a first polarity when the hydraulic motor drives the generator in the third direction, and wherein the generator generates direct current electricity having a second polarity opposite to the first polarity when the hydraulic motor drives the generator in the fourth direction.

12. The system according to Claim 10, wherein the generator generates alternating current electricity when the hydraulic motor drives the generator in the third direction and when the hydraulic motor drives the generator in the fourth direction.

13. The system according to Claim 2, further comprising a mechanical linkage interconnected between the piston and the generator.

14. The system according to Claim 13, wherein the mechanical linkage is a rack and pinion.

15. The system according to Claim 13, wherein the mechanical linkage drives the generator in a first direction when the change in annulus pressure is an increase in annulus pressure, and wherein the mechanical linkage drives the generator in a second direction opposite to the first direction when the change in annulus pressure is a decrease in annulus pressure.

16. The system according to Claim 15, wherein the generator generates direct current electricity having a first polarity when the mechanical linkage drives the generator in the first direction, and wherein the generator generates direct current electricity having a second polarity opposite to the first polarity when the mechanical linkage drives the generator in the second direction.

17. The system according to Claim 15, wherein the generator generates alternating current electricity when the hydraulic motor drives the generator in the first direction and when the hydraulic motor drives the generator in the second direction.

18. The system according to Claim 2, wherein a first portion of the generator is connected to the piston for displacement therewith relative to a second portion of the generator.

19. The system according to Claim 18, wherein the first generator portion is a selected one of a coil and one or more magnets, and wherein the second generator portion is the other of the coil and the magnets.

20. The system according to Claim 2, further comprising a rectifier interconnected between the generator and a power consuming electrical circuit.

21. A system for generating electric power in a subterranean wellbore, the system comprising:

a structure operative to displace in response to a change in well pressure;

a reservoir having hydraulic fluid therein, the hydraulic fluid displacing in response to displacement of the structure;

a hydraulic motor which rotates in response to displacement of the hydraulic fluid; and

a generator which generates electricity in response to rotation of the hydraulic motor.

22. The system according to Claim 21, wherein the structure is a piston which is operative to displace in response to the change in well pressure in an annulus formed between a tubular string and the wellbore.

23. The system according to Claim 22, wherein the hydraulic fluid displaces through a hydraulic circuit including the hydraulic motor, the fluid displacing through the hydraulic circuit in a first direction in response to displacement of the piston in a second direction, and the fluid displacing through the hydraulic circuit in a third flowing direction opposite to the first direction in response to displacement of the piston in a fourth direction opposite to the second direction.

24. The system according to Claim 22, wherein the hydraulic fluid displaces from the reservoir, through the hydraulic motor, and returns to the reservoir in response to displacement of the piston.

25. The system according to Claim 22, wherein the hydraulic fluid displaces through the hydraulic motor in a first flowing direction, thereby rotating the hydraulic motor in a first rotating direction, when the change in annulus pressure is an increase in annulus pressure, and wherein the hydraulic fluid displaces through the hydraulic motor in a second flowing direction opposite to the first flowing direction, thereby rotating the hydraulic motor in a second rotating direction opposite to the first rotating direction, when the change in annulus pressure is an increase in annulus pressure.

26. The system according to Claim 22, wherein the piston has opposite first and second sides, the first side being exposed to a first chamber in fluid communication with the annulus, and the second side being exposed to a second chamber in fluid communication with an accumulator.

27. The system according to Claim 26, further comprising:

first and second check valves and a passage providing fluid communication between the first and second chambers,

wherein the first check valve permits flow through the passage and the second check valve prevents flow through the passage until the piston has displaced a predetermined distance in a first direction when the change in annulus pressure is an increase in annulus pressure, and

wherein the second check valve permits flow through the passage and the first check valve prevents flow through the passage until the piston has displaced the predetermined distance in a second direction when the change in annulus pressure is an decrease in annulus pressure.

28. The system according to Claim 26, wherein the accumulator is in fluid communication with the annulus via a flow restrictor, whereby the change in annulus pressure is directly communicated to the first side of the piston, but the restrictor delays the communication of the change in annulus pressure to the second side of the piston.

29. The system according to Claim 22, wherein the generator generates direct current electricity having a first polarity when the change in annulus pressure is an increase in annulus pressure, and wherein the generator generates direct current electricity having a second polarity opposite to the first polarity when the change in annulus pressure is a decrease in annulus pressure.

30. The system according to Claim 22, wherein the generator generates alternating current electricity when the change in annulus pressure is an increase in annulus pressure and when the change in annulus pressure is a decrease in annulus pressure.

31. A method of generating electric power in a subterranean wellbore of a well, the method comprising the steps of:

positioning an accumulator in the wellbore;

changing pressure in the well proximate the accumulator;

flowing well fluid through an opening of the accumulator in response to the pressure changing step; and

generating electricity in response to the well fluid flowing through the opening.

32. The method according to Claim 31, wherein the positioning step further comprises interconnecting the accumulator in a tubular string, and forming an annulus between the tubular string and the wellbore, and wherein the pressure changing step further comprises changing pressure in the annulus proximate the accumulator.

33. The method according to Claim 32, wherein the electricity generating step is performed in response to well fluid flowing through the opening in a first direction, and wherein the electricity generating step is performed in response to well fluid flowing through the opening in a second direction opposite to the first direction.

34. The method according to Claim 32, wherein well fluid flows into the accumulator through the opening when annulus pressure is increased in the pressure changing step, and wherein well fluid flows out of the accumulator through the opening when annulus pressure is decreased in the pressure changing step.

35. The method according to Claim 32, further comprising the step of displacing a piston in response to the pressure altering step, and wherein the electricity generating step is performed further in response to the piston displacing step.

36. The method according to Claim 35, wherein the piston displacing step further comprises causing relative displacement between a coil and one or more magnets of a generator, and wherein the electricity generating step further comprises generating electricity as a result of the relative displacement between the coil and magnets.

37. The method according to Claim 35, wherein the piston displacing step further comprises displacing a hydraulic fluid with the piston, and wherein the electricity generating step further comprises generating electricity as a result of the displacement of the hydraulic fluid.

38. The method according to Claim 37, wherein the hydraulic fluid displacing step further comprises displacing the hydraulic fluid through a hydraulic motor.

39. The method according to Claim 38, wherein the hydraulic fluid displacing step further comprises driving an electric generator with the hydraulic motor.

40. The method according to Claim 39, wherein the electric generator driving step further comprises driving the generator in a first direction when annulus pressure is increased in the pressure changing step, and wherein the electric generator driving step further comprises driving the generator in a second direction opposite to the first direction when annulus pressure is decreased in the pressure changing step.

41. The method according to Claim 35, wherein the piston displacing step further comprises operating a mechanical linkage interconnected between the piston and a generator.

42. The method according to Claim 32, further comprising the step of rectifying the electricity generated in the generating electricity step.

43. The method according to Claim 42, wherein the rectifying step is performed by interconnecting a full wave rectifier between a generator and a power consuming electrical circuit.

44. A method of generating electric power in a subterranean wellbore, the method comprising the steps of:

positioning a tubular string in the wellbore, thereby forming an annulus between the tubular string and the wellbore;

changing pressure in the annulus; and

generating electric power in response to the pressure changing step.

45. The method according to Claim 44, further comprising the step of isolating the annulus from an interior of the tubular string, and wherein the pressure changing step further comprises changing pressure in the annulus while the annulus is isolated from the tubular string interior.

46. The method according to Claim 45, further comprising the step of altering pressure in an accumulator interconnected in the tubular string in response to the pressure changing step.

47. The method according to Claim 46, wherein the accumulator pressure altering step further comprises displacing a piston.

48. The method according to Claim 47, wherein the piston displacing step causes displacement of at least a portion of a generator in the electric power generating step.

49. The method according to Claim 45, further comprising the step of displacing a piston in response to the pressure changing step.

50. The method according to Claim 49, wherein the piston displacing step further comprises forcing a fluid through a hydraulic circuit, thereby operating a hydraulic motor.

51. The method according to Claim 49, wherein the piston displacing step further comprises driving a generator via a mechanical linkage interconnected between the piston and the generator.

52. The method according to Claim 49, wherein the piston displacing step further comprises displacing a first portion of a generator with the piston relative to a second portion of the generator.